

SOUTHWEST FISHERIES CENTER

NATIONAL MARINE FISHERIES SERVICE

SOUTHWEST FISHERIES CENTER

P.O. BOX 271

LA JOLLA, CA 92038

DECEMBER 1986

AN ENVIRONMENTAL DATA BASE DESCRIBING COASTAL SOUTHERN CALIFORNIA IN THE YEARS 1920-1984 PART I: PROCEDURES AND SUMMARIES

By

Michael H. Prager and Alec D. MacCall

Library
NOAA, National Marine Fisheries Service
SWFC Honolulu Laboratory F/SWC2
2570 Dole Street
Honolulu, HI 96822-2396

ADMINISTRATIVE REPORT LJ-86-31

This Administrative Report is issued as an informal document to ensure prompt dissemination of preliminary results, interim reports and special studies. We recommend that it not be abstracted or cited.

An Environmental Data Base
Describing
Coastal Southern California
In the Years 1920-1984

* * *

Part I: Procedures & Summaries

by

Michael H. Prager

Alec D. MacCall

Administrative Report No. LJ-86-31

National Marine Fisheries Service

Southwest Fisheries Center

Post Office Box 271

La Jolla, California 92038

Issued December, 1986

Revised April, 1987

Abstract

We have combined eighteen time series of environmental data into several databases. The data, which span the years 1920-1984, include rainfall, salinity, sea surface temperature, sea level, and upwelling index observations for coastal Southern California.

Sixteen of the eighteen series were processed to facilitate their anticipated use in modeling: the processing comprised detrending, deseasonalization, standardization, and estimation of missing values. The data at each major stage of processing are stored in an individual database (SAS data set) and an equivalent text (ASCII) file, readable by IBM PC-compatible microcomputers.

The processing procedures and the data themselves are described in two administrative reports. This one (No. LJ-86-31) documents the procedures used in processing the data, and also contains tables of summary statistics. The second report (No. LJ-86-32) contains tables of the data at each major stage of processing.

Table of Contents

Abstract	1
Table of Contents	2
List of Tables	3
Introduction	4
Sources of Data	4
Data Entry and Compilation	6
Detrending	8
Deseasonalization	9
Estimation of Missing Values	10
Figures	14
Program Listings and Tables	26

List of Tables

Table 1. Time series data described in this report	5
Program Listing 1. Detrending SST, SL data	26
Program Listing 2. Standardization of data by month	27
Program Listing 3. Estimation of missing values	27
Table 2. Contents of data set ENVIRON.MASTER1 (environmental data as received from PFEG)	28
Table 3. Summary statistics of SAS data set ENVIRON.MASTER1	29
Table 4. Summary Statistics of SAS data set ENVIRON.MASTER1, by month	30
Table 5a. Trend analysis of Farralon Islands SST data . . .	33
Table 5b. Trend analysis of Pacific Grove SST data	33
Table 5c. Trend analysis of San Luis Wharf SST data	34
Table 5d. Trend analysis of San Diego SST data	34
Table 5e. Trend analysis of San Francisco sea level data .	35
Table 5f. Trend analysis of Los Angeles sea level data . .	35
Table 5g. Trend analysis of San Diego sea level data . . .	36
Table 6. Contents of SAS data set ENVIRON.DETREND	37
Table 7. Summary statistics of ENVIRON.DETREND, by month . .	38
Table 8. Summary statistics of ENVIRON.MASTER3, by month . .	40
Table 9. Contents of SAS data set ENVIRON.MASTER4	42
Table 10. Summary Statistics of ENVIRON.MASTER4, by month .	43
Table 11. Correlations of data in ENVIRON.MASTER4	46

1. Introduction

This administrative report is one of two which describe the compilation, transformation, and storage of an environmental data base from coastal southern California for the years 1920-1984. The reports form part of a study of the effects of contaminants on southern California marine fish stocks; the study is sponsored by the NOAA/NOS Ocean Assessments Division and is conducted by the NOAA/NMFS Coastal Fisheries Division, Southwest Fisheries Center, La Jolla, California.

The relevant data comprise the time series listed in Table 1. (The variable codes in that table are used throughout the reports.) Rainfall data from Long Beach were combined with those from Los Angeles, and rainfall data from Oakland with those from San Francisco, respectively, to create two continuous series.

The contents of the two administrative reports are as follows: This one (No. LJ-86-31) documents the procedures used in transforming the data, and includes tables of summary statistics. The second report (No. LJ-86-32) contains tables of the data themselves at each major step of processing. A revised editions of each report incorporates corrections and additional data.

2. Sources of Data

Most of the data were provided by Dr. Andrew Bakun of the Pacific Fisheries Environmental Group (PFEG), Southwest Fisheries Center, Monterey, CA. Arnold Mantyla of the Scripps Institution

Table 1. Time series data described in this report.

Type of Data	Station Location(s)	Code
Rainfall (1920-1984)	San Francisco, Oakland	RainSF
	Los Angeles, Long Beach	RainLA
	San Diego	RainSD
Ocean Water Salinity (1920-1984)	Scripps Pier: Surface	SalTop
	Scripps Pier: Bottom	SalBot
Sea Surface Temperature (1920-1984)	Farralon Islands	SSTF
	Pacific Grove	SSTPG
	San Luis Wharf	SSTSLW
	San Diego	SSTSD
Bakun's upwelling index (1946-1984)	30°N-119°W	U30119
	33°N-119°W	U33119
	36°N-122°W	U36122
	39°N-122°W	U39122
Sea Level (1920-1984)	San Francisco	SLSF
	Monterey	SLMon
	Santa Monica	SLSM
	Los Angeles	SLLA
	San Diego	SLSD

of Oceanography pointed out some errors in the data, and provided additional data to fill several missing points. Sources cited by Dr. Bakun for data are:

Rainfall

No specific references available. Data were extracted by Paul Sund (PFEG) from a data file named "Tape #TD9645, World Weather Records--Surface" obtained from NOAA, National Climate Data Center, Asheville, North Carolina.

Salinity and Sea Surface Temperatures

Scripps Institution of Oceanography data reports in the SIO Reference series; e.g.: Anonymous. 1985. Data Report:

Surface water temperatures at shore stations, United States west coast, 1985. Reference 86-18, University of California, La Jolla. 43 pp., tables.

Upwelling Index (before 1972)

Bakun, A. 1973. Coastal upwelling indices, west coast of North America, 1946-71. U. S. Department of Commerce NOAA Technical Report NMFS SSRF-671. 103 pp.

Upwelling Index (1972-1985)

Mason, J. E., and A. Bakun. In press. Upwelling index update, U. S. west coast, 33°N-48°N latitude. U. S. Department of Commerce Technical Memorandum NMFS-SWFC-xxxx. 81 pp.

Sea Level

No specific references available. Data were extracted by Doug McLain (PFEG) from files provided by NOAA/NOS.

The units of measure are as follows: rainfall, millimeters; salinity, parts per hundred thousand; sea surface temperature, degrees Celsius; upwelling index, cubic meters per second per 100 meters of coastline; sea level, hundredths of feet.

3. Data Entry and Compilation

The computers used for analysis (the IBM PC and the IBM PC AT¹) dictated the format and media (5-1/4" diskettes and internal disk drives) used for storage and compilation of data. Data

¹ Reference to trade names does imply endorsement by the National Marine Fisheries Service, NOAA.

submitted to the Southwest Fisheries Center on compatible diskettes were copied directly to fixed-disk files on the Center's microcomputers. Data submitted only on paper were entered with editor and spreadsheet programs. Comparisons of printed reports to the original data tables confirmed the integrity of the data entry and manipulation at each step.

The resulting files were read into the SAS statistical software to create the SAS data set ENVIRON.MASTER1; the additional variable DATE was added by the SAS statement

```
DATE = MDY (Month,15,Year);
```

The DATE variable thus contains SAS date values, which are stored as the number of days elapsed since January 1, 1960. (Dates before January 1, 1960, are stored as negative numbers.) Since such date values are independent of the number of days in a month, etc., they can be used as correct measures of elapsed time. The 15th of the month was used for each date because each month's represents a monthly mean or summary.

Before any further processing, the two series of sea level at the Santa Monica and Monterey stations were dropped from the data base. These series were dropped because of their high proportions of missing data, and the proximity of stations at Los Angeles and San Francisco. The reduced data are stored as SAS data set ENVIRON.MASTER2.

Several tables describe data set ENVIRON.MASTER1 (and therefore closely describe data set ENVIRON.MASTER2). Table 2 is the report of the SAS CONTENTS procedure on the data set. Table 3 gives overall summary statistics; from this one can see the

pattern of missing values. Table 4 gives summary statistics by month. A listing of the data is included in Part II of this report.

4. Detrending

We detrended both the sea level (SL) and sea surface temperature (SST) series to remove rising trends with time. We omitted from the trend analyses all values for 1983, so that data from this extreme El Niño year near the end of the series would not bias the results. Also, if a series started with an incomplete year's data, the first year's data were omitted from the trend analysis: the seasonal component in these series is so strong that any phase difference between the beginning and end of a series would seriously bias the trend. Assuming that the trends were roughly linear, we used OLS regression analysis (the SAS REG procedure) to compute a trend line for each of the seven series (SSTF, SSTPG, SSTSLW, SSTSD, SLSF, SLLA, and SLSD). The regression analyses indicated a significant trend for each series except sea surface temperature in San Diego, which accordingly was not detrended. Regression results, including ANOVA tables, are shown in Table 5. The unit of measure of time in these regressions is days (since January 1, 1960).

After reinstating the 1983 values and any first-year values omitted to prevent bias, residuals from the trend line for each series (except SSTSD) were calculated and used in place of the original data for all further analysis. The SAS data set ENVIRON.DETREND contains the six detrended data series. Several

tables and listings describe this SAS data set. Table 6 contains the output of the SAS CONTENTS procedure. Table 7 has summary statistics of the detrended data. Program Listing 1 is the SAS program used to detrend one of the series. The same program, with minor modification, was used to detrend each of the SST and SL series. A complete data listing is included in Part II of this report.

5. Deseasonalization

We next standardized and deseasonalized the data. Each variable was standardized by month of the year to a mean of 0.0 and a standard deviation of 1.0. (For example, the 65 January values [1920-1984] of the LA rainfall series were standardized as a group to mean 0.0 and standard deviation 1.0. Then, the February values were treated the same way. This was repeated through December for each month and time series separately, thus removing seasonal effects and standardizing the data.) The data after standardization form SAS data set ENVIRON.MASTER3. The means and standard deviations of the data before standardization are given (by month) in Tables 4 and 7; summary statistics on the standardized data are given in Table 8. The SAS program used for standardization and deseasonalization is given in Program Listing 2. A data listing is included in Part II of this report.

6. Estimation of Missing Values

6.1. Introduction

The environmental data included many missing values (**Table 3**), for which we estimated values so that multivariate statistical techniques (factor analysis, Box-Jenkins time series analysis) could be applied later. Some series were complete from 1920 through 1984: rainfall data from San Francisco, Los Angeles, and San Diego; Scripps Pier surface salinity; San Diego sea surface temperature; and San Francisco sea level data. The upwelling index series were complete from 1946 through 1984; no missing values were estimated for these series. Each other series had one or more missing values estimated.

6.2. Estimation

We used the BMDP procedure AM ("Description and Estimation of Missing Data") to estimate the missing values by stepwise regression on the nonmissing data for each case. In preparation, the data were written from the SAS data set ENVIRON.MASTER3 to a text file. The BMDP control language for the missing value analysis forms **Program Listing 3**.

The BMDP output file was then read to form SAS data set ENVIRON.MASTER4. The SAS CONTENTS report on this data set forms **Table 9**; summary statistics comprise **Table 10**. Because of the estimation of missing values, some monthly means and standard deviations are not precisely 0.0 and 1.0. A correlation matrix

of the data forms Table 11. A listing of the data is included in Part II of this report.

6.3. Simulation

To examine the properties of our missing value estimation, we simulated the estimation process. For each variable, we deleted some known values, estimated them, and graphically compared the estimates to the true values. The results show that the estimation procedures we used perform reasonably, and are better, for example, than simply substituting the mean for the missing values.

Simulations were not conducted for the rainfall variables, upwelling index variables, or for SSTSD, SLSF, or SLLA, as these series each had few or no missing values. Simulations of the remaining variables were mostly conducted individually; however, simulations of SALBOT and of SSTPG, which are uncorrelated, were done together. The period of each simulation was chosen randomly, and consisted of whole calendar years. The results compare the estimated monthly values and their yearly means to actual values. We included means because we anticipate that many applications will use yearly rather than monthly data.

SALBOT: Simulation was made for three one-year periods: 1942, 1953, and 1966. The results are presented in **Figures 1-3**. Note that the last point in each figure represents the estimated and actual yearly mean salinity. The estimates were extremely good, probably because surface salinity values are available from the same location.

SLLA: Simulation was done for the five-year period 1935-1939. The results are shown on a monthly basis in **Figure 4** and on a yearly mean basis in **Figure 5**.

SSTF: Simulation was done for the five-year period 1979-1983. Monthly results are shown in **Figure 6**, yearly results in **Figure 7**. Although the estimation of monthly values was quite successful, there were some residuals of about 1 standard deviation (**Figure 6**). The yearly means show a maximum deviation of about 0.35 standard deviations for the five years tested.

SSTPG: This variable was simulated for three one-year periods: 1937, 1939, and 1958. The results (**Figures 8-10**) include yearly mean values.

SSTSLW: Simulation was done for the five-year period 1951-1955. The real data in this period includes some missing values (principally in early 1952), which are omitted from the "actual" line in **Figure 11**. In preparing **Figure 12**, which shows the yearly means, these points were omitted from calculations.

Figure 1. Simulation test of missing value estimation for variable SALBOT in 1942 (see text). Last point is the yearly mean.

Figure 2. Simulation test of missing value estimation for variable SALBOT in 1953 (see text). Last point is the yearly mean.

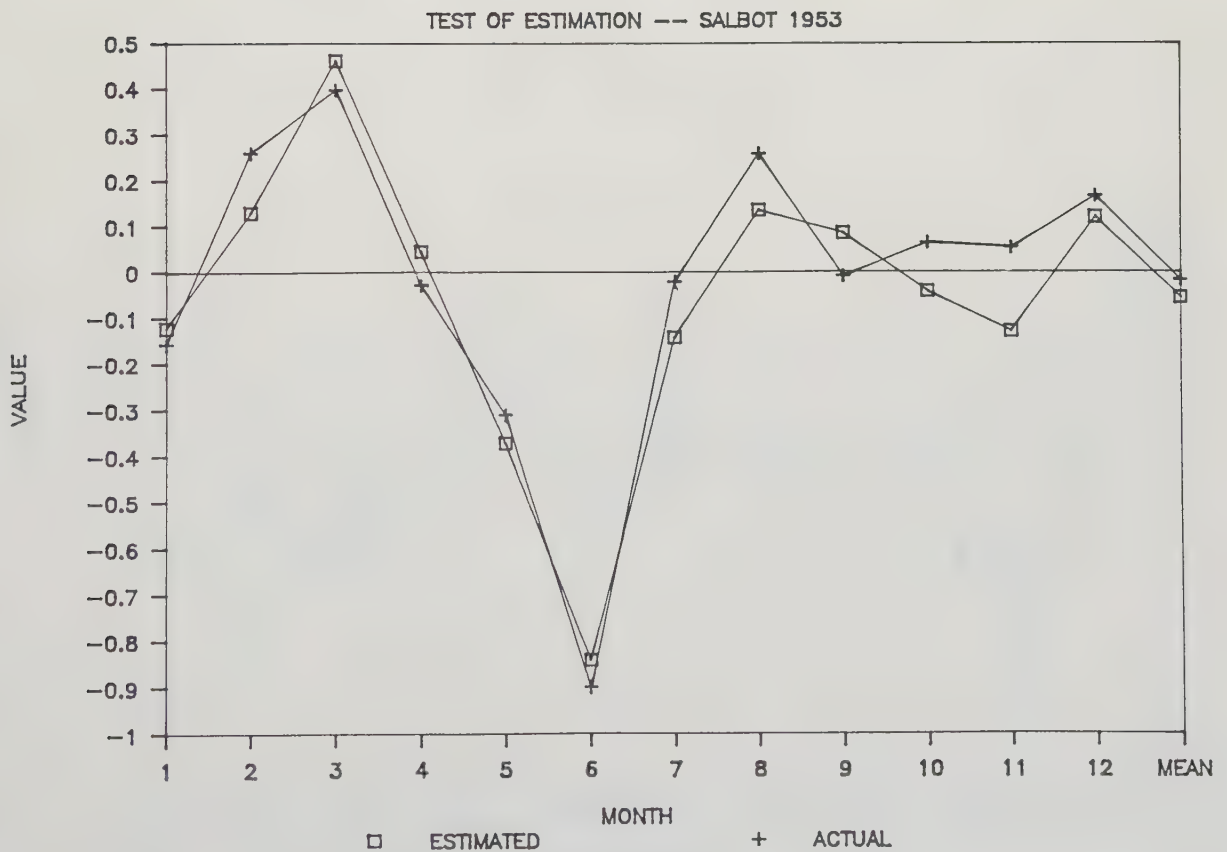
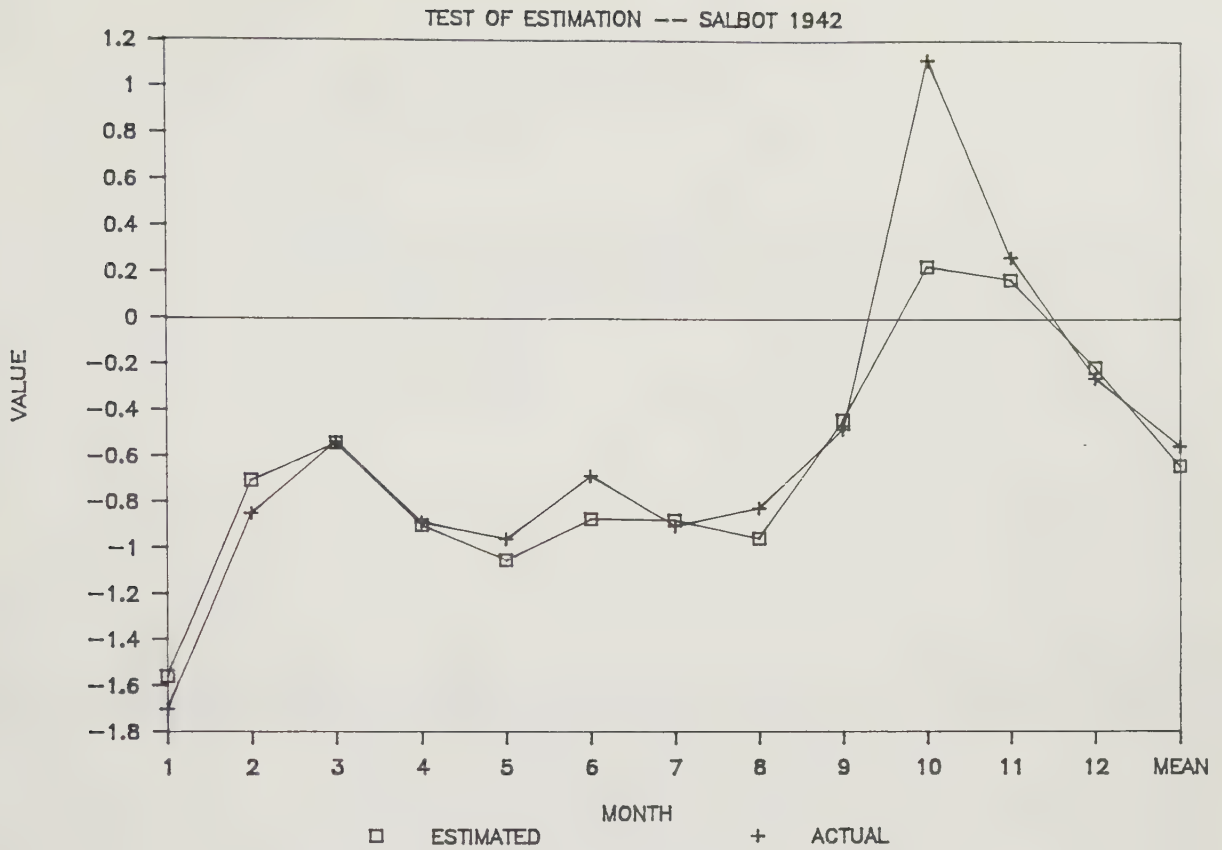


Figure 3. Simulation test of missing value estimation for variable SALBOT in 1966 (see text). Last point is the yearly mean.

Figure 4. Simulation test of missing value estimation for variable SLLA in calendar years 1935-1939 (see text). Monthly data and estimated values are shown.

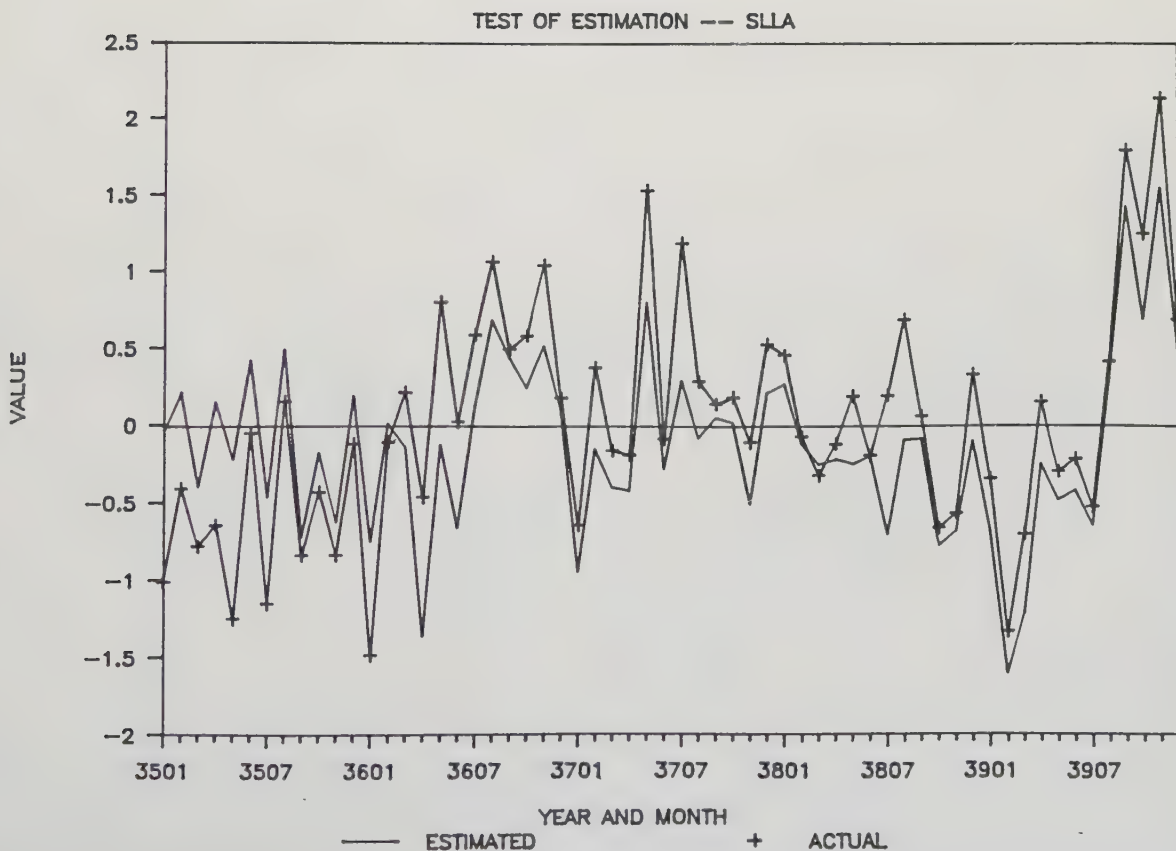
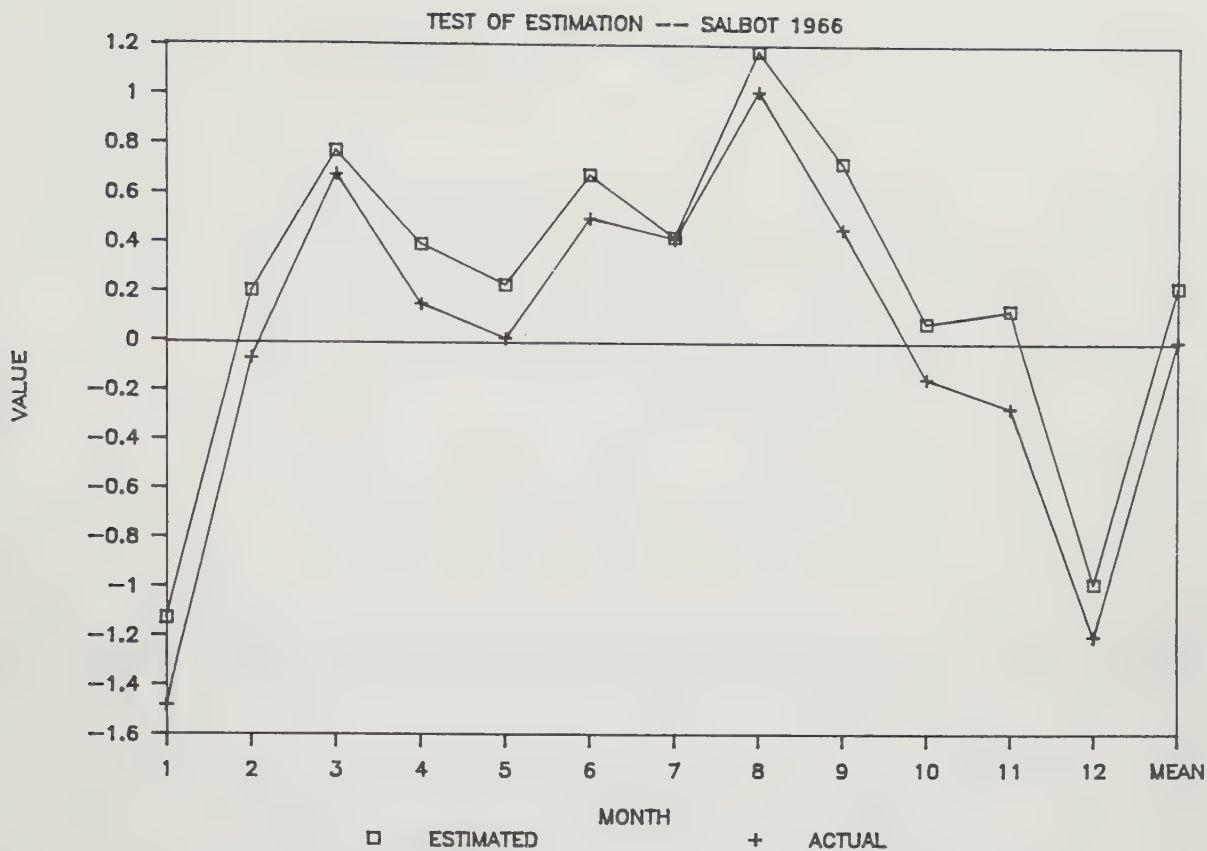


Figure 5. Simulation test of missing value estimation for variable SLLA in calendar years 1935-1939 (see text). Yearly mean data and mean estimated values are shown. Final point is the grand mean.

Figure 6. Simulation test of missing value estimation for variable SSTF in calendar years 1979-1983 (see text). Monthly data and estimated values are shown.

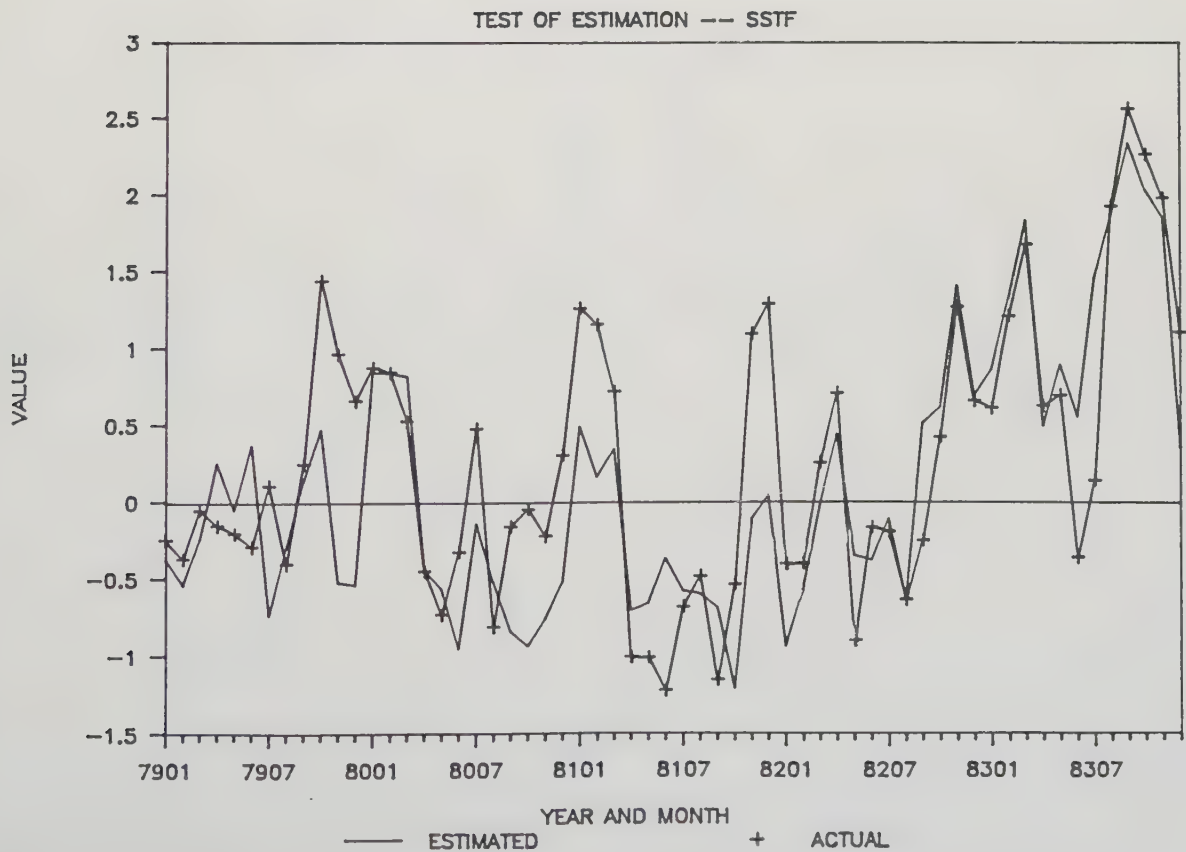
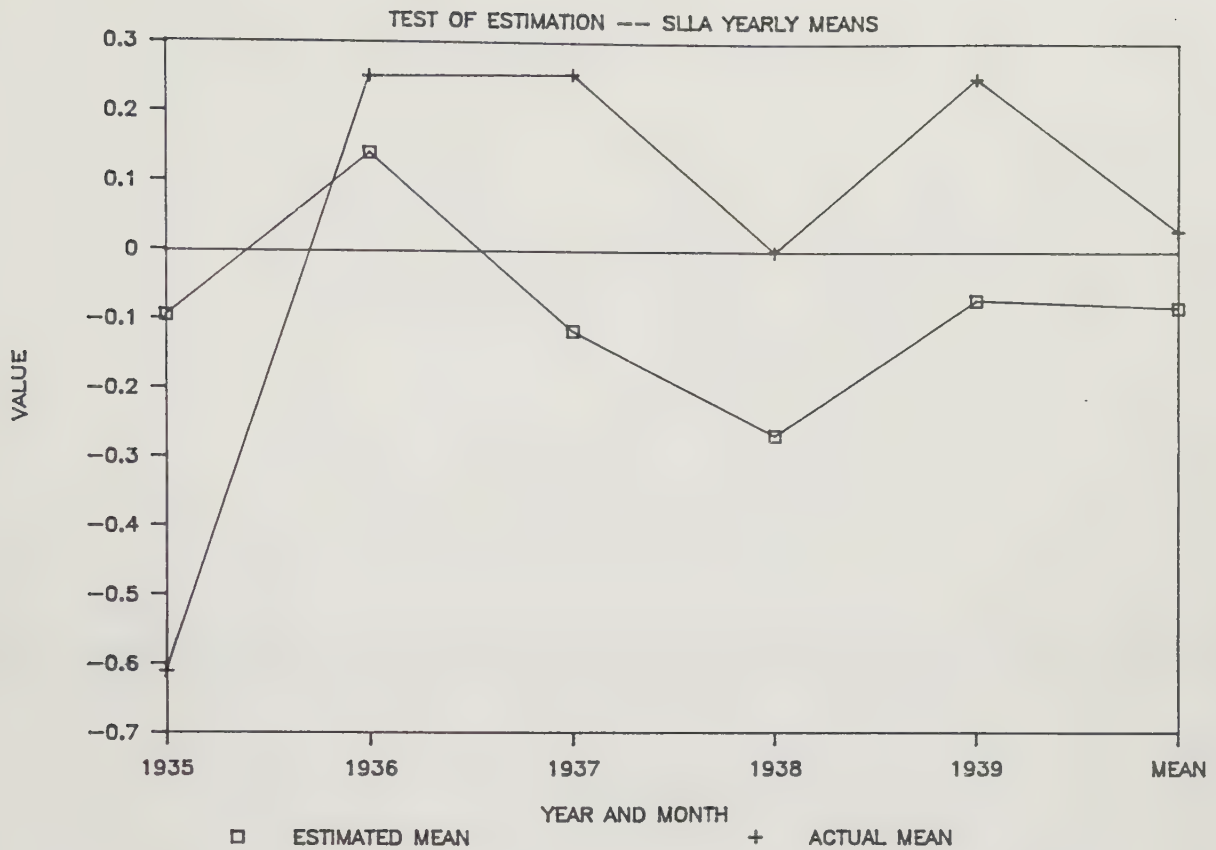


Figure 7. Simulation test of missing value estimation for variable SSTF in calendar years 1979-1983 (see text). Yearly mean data and mean estimated values are shown. Final point is the grand mean.

Figure 8. Simulation test of missing value estimation for variable SSTPG in 1937 (see text). Last point is the yearly mean.

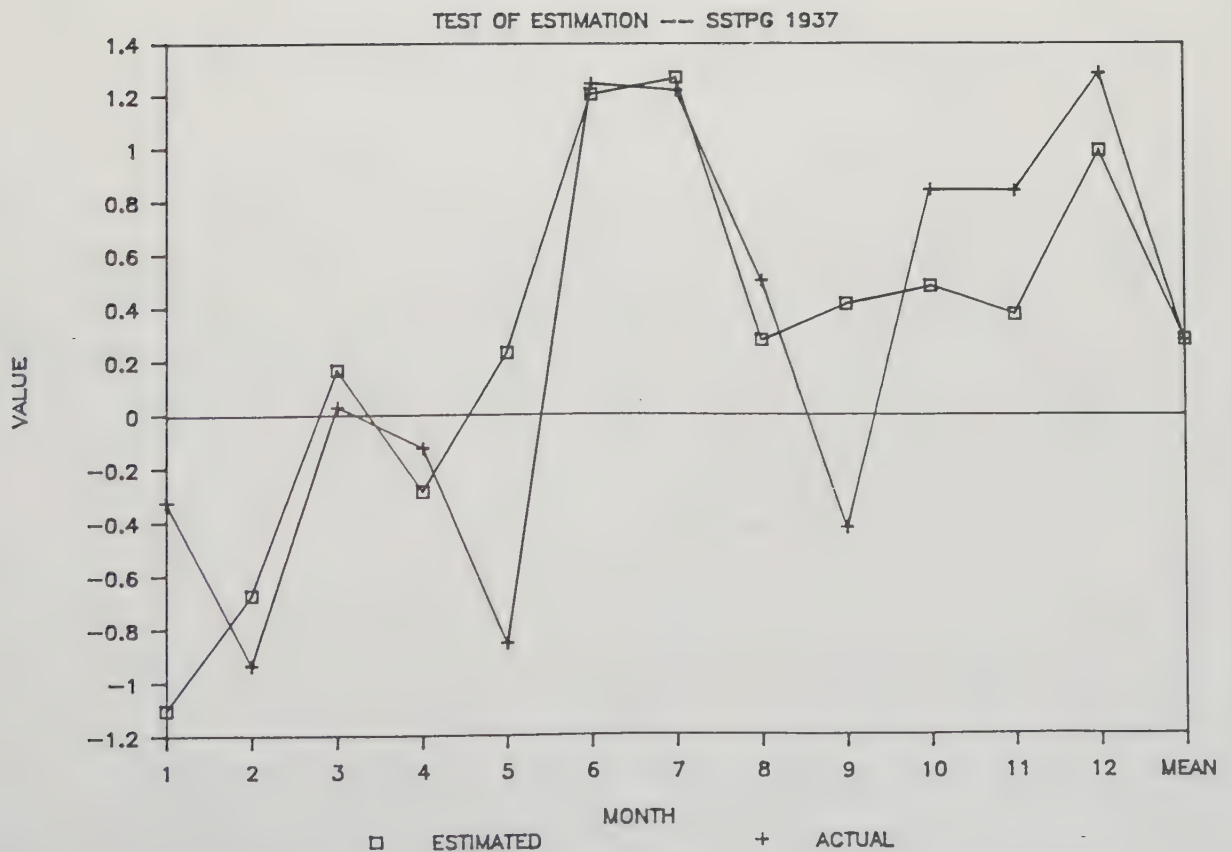
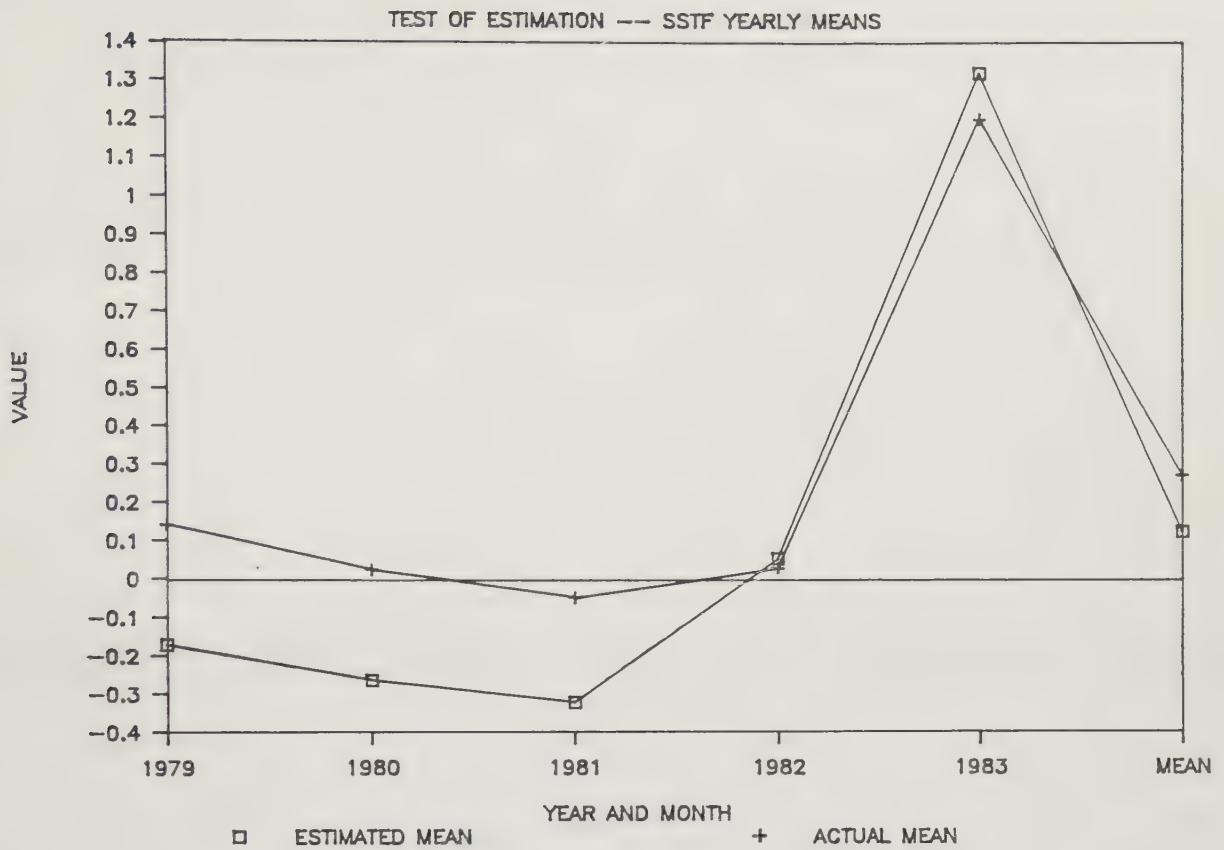


Figure 9. Simulation test of missing value estimation for variable SSTPG in 1939 (see text). Last point is the yearly mean.

Figure 10. Simulation test of missing value estimation for variable SSTPG in 1958 (see text). Last point is the yearly mean.

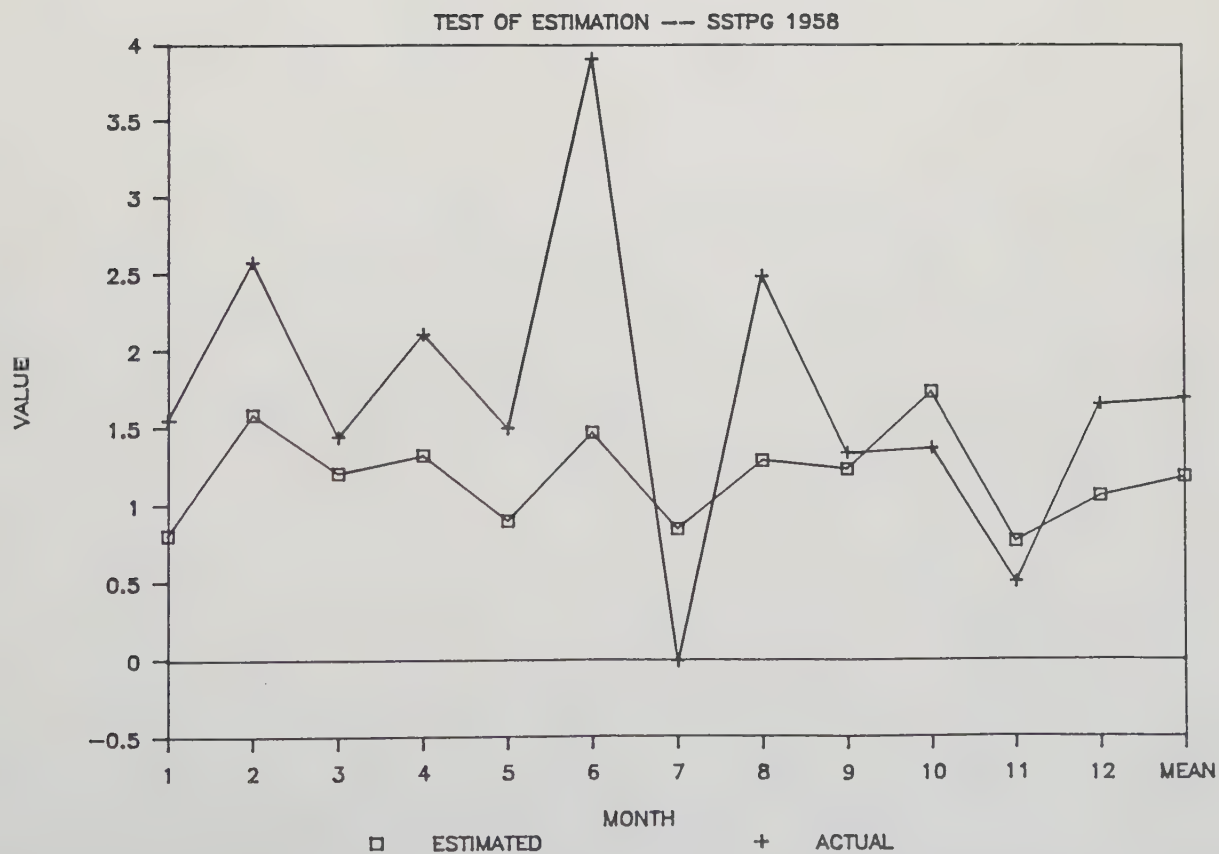
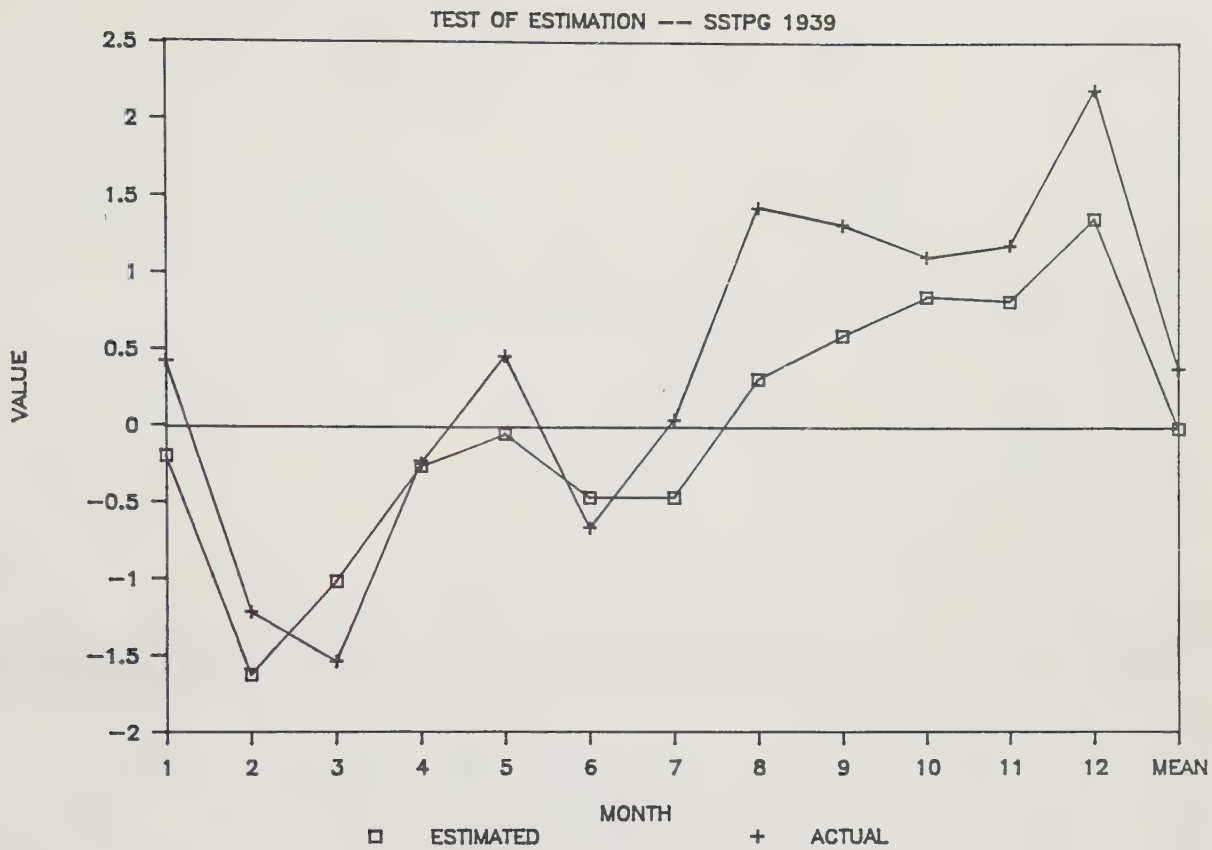
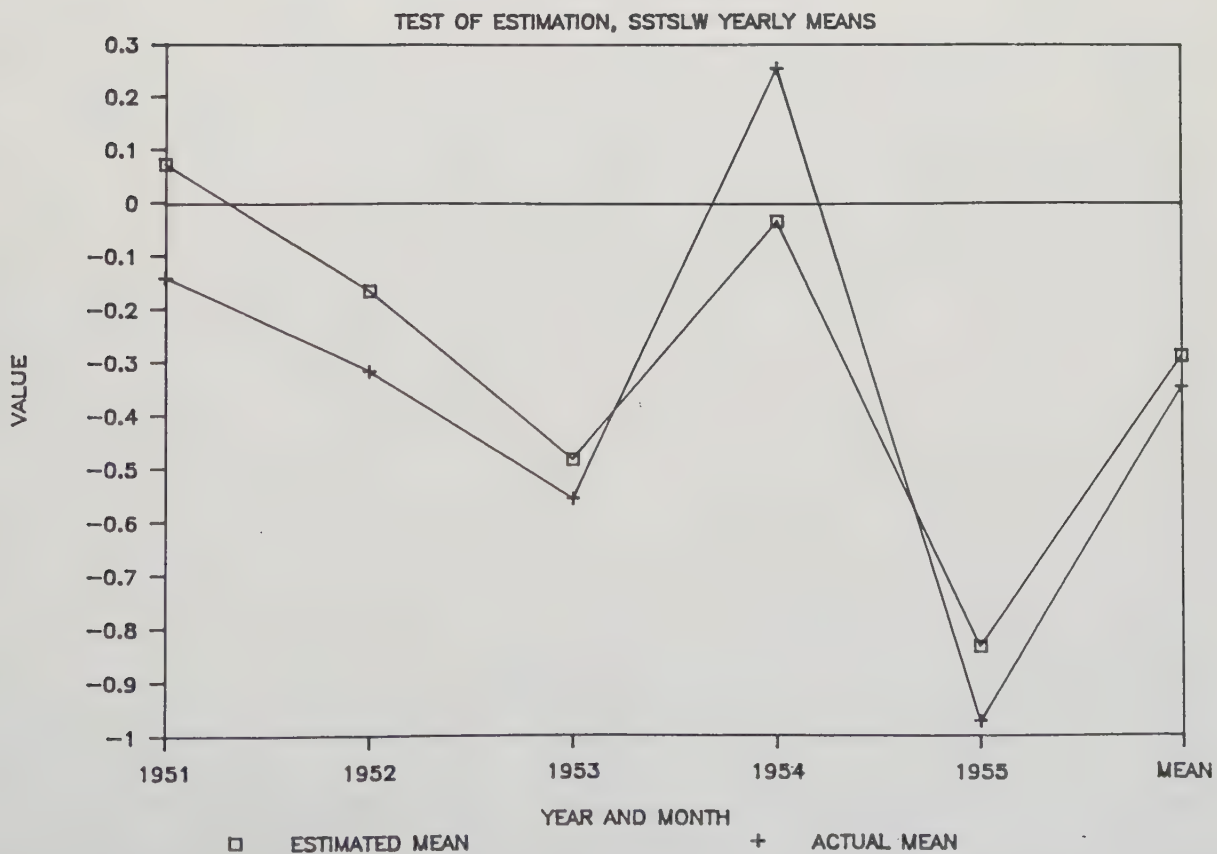
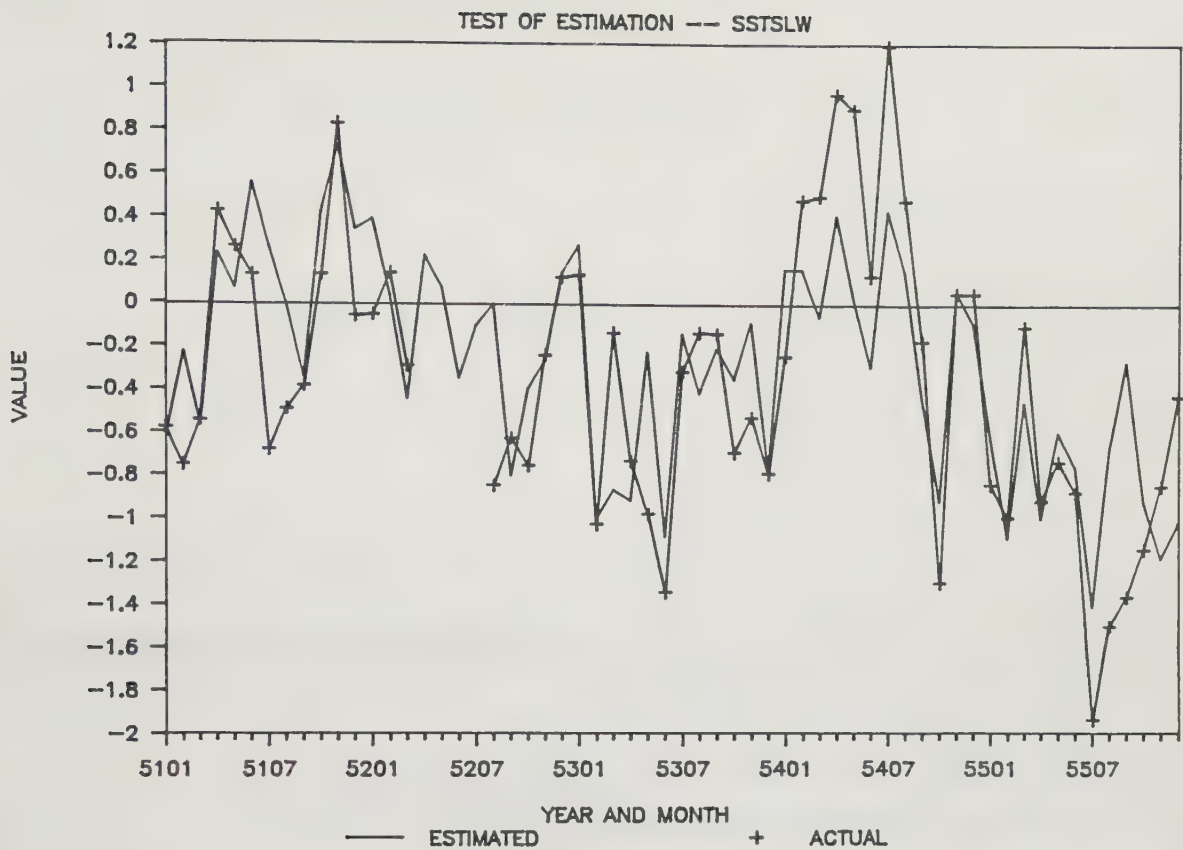


Figure 11. Simulation test of missing value estimation for variable SSTSLW in calendar years 1951-1955 (see text). Monthly data and estimated values are shown.

Figure 12. Simulation test of missing value estimation for variable SSTSLW in calendar years 1951-1955 (see text). Yearly mean data and mean estimated values are shown. Final point is the grand mean.



Program Listings and Tables

Program Listing 1. Detrending SST, SL data.

```
* DETREND2.SAS;
* A SAS job to detrend SST and SL data;
*;
%let depvar = SLSF;          /* Dependent variable */
%let start = 1920;          /* First complete year */
*;
* First make a working data subset;
*;
data templ;
    set environ.master2;
    keep &depvar year date;
    if year < &start then &depvar = .;
    if year = 1983 then &depvar = .; /* El Nino year set missing*/
*;
* Run the regressions & output the parameters;
*;
proc reg data=templ outest=parmds;
    title "Detrend &depvar Data";
    d&depvar: model &depvar = date;
*;
* Put back the omitted data values;
*;
data temp2;
    update templ environ.master2
        (keep=date year &depvar);
    by date;
*;
* Make new var ("D" + var name) for residuals (detrended var);
* Note: var name is taken from MODEL statement of PROC REG;
*;
proc score data=temp2 score=parmds type=parms residual
    nostd out=environ.d&depvar;
    var &depvar date;
run;
%put *** End of Program ***;
```

Program Listing 2. Standardization of data by month.

```
data environ.templ;
  merge environ.master2
    (drop=sstf sstpg sstslw sstsd slsf slla slsd)
  environ.detrend;
  by date;
proc sort data=environ.templ;
  by month;
proc standard data=environ.templ out=environ.master3
  (label='Detrended, Standardized Environmental Data')
  mean=0 std=1;
  var rainsf rainla rainsd saltop salbot sstf sstpg sstslw sstsd
    u30119 u33119 u36122 u39122 slsf slla slsd;
  by month;
run;
```

Program Listing 3. Estimation of missing values.

```
$comment      Program file ESTIMATE.INP;
               Read environmental data, estimate missing values;
               Using BMDP AM program;
$problem      Title = 'Estimate missing environmental data';
$input        variables = 14;
               format = free;
               reclen = 140;
               file = 'master3.asc';
               mchar = '*';
               errmax = 1;
$vars         names = year, month, rainsf, rainla, rainsd,
               saltop, salbot, sstf, sstpg, sstslw, sstsd,
               slsf, slla, slsd;
               use = rainsf, rainla, rainsd, saltop, salbot,
               sstf, sstpg, sstslw, sstsd, slsf, slla, slsd;
$save         file = 'master4.asc';
               format = '(1X,F6.0,1X,F3.0,12(1X,F9.5))';
$estimate     method = step;
               vlimit = 6;
               climit = 75;
$end
```

Table 2. Contents of data set ENVIRON.MASTER1 (environmental data as received from PFEG).

SAS CONTENTS PROCEDURE

Dsname: ENVIRON.MASTER1

Data Set Label: Environmental Data, Corrected 4/2/87

Number of Observations: 780

Number of Variables: 21

Record Length: 172

Data Set Type:

Memtype: DATA

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Leng	Pos	Format	Informat	Label
21	DATE	Num	8	164	DATE7.		
2	MONTH	Num	8	12			
3	RAINLA	Num	8	20			
4	RAINSR	Num	8	28			
5	RAINSF	Num	8	36			
7	SALBOT	Num	8	52			
6	SALTOP	Num	8	44			
17	SLLA	Num	8	132			
19	SLMON	Num	8	148			
16	SLSD	Num	8	124			
20	SLSF	Num	8	156			
18	SLSM	Num	8	140			
8	SSTF	Num	8	60			
9	SSTPG	Num	8	68			
11	SSTSD	Num	8	84			
10	SSTSLW	Num	8	76			
14	U36122	Num	8	108			
13	U33119	Num	8	100			
12	U30119	Num	8	92			
15	U39122	Num	8	116			
1	YEAR	Num	8	4			

Table 3. Summary statistics of SAS data set ENVIRON.MASTER1.

Variable Code	Mean	Sample Std Dev	Minimum	Maximum	N Obs	N Missing
RAINSF	43.54	57.61	0.00	312.00	780	0
RAINLA	30.16	51.72	0.00	379.00	780	0
RAINSF	21.63	34.18	0.00	235.20	780	0
SALTOP	3360.13	15.07	3273.00	3401.00	780	0
SALBOT	3359.13	14.24	3273.00	3396.00	696	84
SSTF	12.25	1.29	9.39	16.33	559	221
SSTPG	13.04	1.20	9.84	17.39	742	38
SSTSLW	13.88	1.68	10.60	18.41	444	336
SSTSD	16.90	2.47	11.96	23.65	780	0
U30119	125.43	67.11	1.00	347.00	468	312
U33119	141.34	119.44	-16.00	515.00	468	312
U36122	106.93	99.81	-36.00	413.00	468	312
U39122	78.00	100.55	-150.00	372.00	468	312
SLSF	880.53	26.26	809.00	996.00	780	0
SLMON	610.30	22.37	561.00	688.00	252	528
SLSM	508.73	23.36	445.00	581.00	522	258
SLLA	653.27	20.94	602.00	733.00	726	54
SLSD	643.21	25.01	584.00	739.00	780	0

Table 4. Summary statistics of ENVIRON.MASTER1, by month.

Variable Code	Mean							
	Month							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
RAINSF	110.46	89.29	73.06	38.76	10.81	3.29	0.53	0.84
RAINLA	73.26	74.39	59.22	29.29	5.33	1.33	0.09	1.70
RAINSF	47.43	46.99	43.44	20.28	6.04	1.43	0.36	2.16
SALTOP	3353.72	3349.62	3347.20	3355.66	3366.08	3370.92	3371.46	3369.48
SALBOT	3354.14	3350.00	3347.47	3356.49	3365.83	3369.34	3368.19	3365.60
SSTF	11.79	11.86	11.63	11.29	11.28	11.66	12.29	12.91
SSTPG	11.87	12.09	12.29	12.48	12.76	13.45	13.93	14.05
SSTSLW	12.56	12.69	12.46	12.39	12.95	14.07	15.39	15.92
SSTSD	14.13	14.06	14.54	15.41	16.92	18.40	19.88	20.78
U30119	52.41	73.23	119.15	158.72	205.59	214.18	160.33	153.56
U33119	13.67	40.38	114.59	191.31	288.33	322.46	250.90	218.49
U36122	6.56	22.95	73.56	137.05	220.92	250.13	213.08	188.31
U39122	-16.97	-6.41	33.82	84.08	163.08	203.44	208.56	165.38
SLSF	889.46	888.03	871.68	858.58	861.69	872.83	883.28	887.54
SLMON	618.00	609.24	596.14	584.86	589.76	601.29	613.77	622.00
SLSM	503.81	497.51	489.47	483.91	491.21	505.12	520.86	528.20
SLLA	650.00	643.98	633.30	628.02	635.78	649.07	663.60	671.77
SLSD	639.11	632.18	622.05	618.23	625.45	638.75	654.43	661.88

Variable Code	Mean				
	Month				ALL
	Sep	Oct	Nov	Dec	
RAINSF	5.66	28.28	62.97	98.49	43.54
RAINLA	6.91	9.51	38.39	62.50	30.16
RAINSF	4.43	11.62	25.89	49.51	21.63
SALTOP	3362.91	3359.85	3358.83	3355.80	3360.13
SALBOT	3360.09	3358.40	3357.51	3356.05	3359.13
SSTF	13.56	13.56	12.88	12.22	12.25
SSTPG	14.35	13.89	12.99	12.39	13.04
SSTSLW	15.83	15.13	13.90	12.88	13.88
SSTSD	19.45	18.00	16.32	14.93	16.90
U30119	133.54	106.59	72.69	55.13	125.43
U33119	141.15	78.64	26.03	10.08	141.34
U36122	100.38	49.87	14.56	5.72	106.93
U39122	85.49	32.10	-3.13	-13.41	78.00
SLSF	894.60	886.31	883.75	888.63	880.53
SLMON	630.86	621.67	620.48	615.76	610.30
SLSM	535.32	522.45	513.64	511.60	508.73
SLLA	677.08	668.30	659.90	657.31	653.27
SLSD	668.92	659.14	650.60	647.78	643.21

Table 4 (cont.). Summary statistics of ENVIRON.MASTER1, by month.

Variable Code	Sample Std Deviation								
	Month								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
RAINSF	66.87	65.11	51.77	37.69	18.02	5.50	1.43	2.45	12.68
RAINLA	74.18	79.89	52.26	35.95	13.05	2.84	0.20	6.78	20.00
RAINSF	42.50	43.11	39.12	24.20	11.66	2.59	0.92	7.70	11.22
SALTOP	14.22	17.41	21.56	16.06	11.74	8.57	8.75	8.85	8.75
SALBOT	13.59	15.33	21.43	16.33	12.29	9.26	9.08	9.25	8.54
SSTF	0.96	1.15	1.14	1.15	1.06	0.92	0.91	0.97	1.03
SSTPG	0.89	0.94	0.94	0.82	0.78	0.84	0.76	0.85	0.91
SSTSLW	1.02	1.13	1.17	0.86	0.91	0.97	0.98	1.01	1.08
SSTSD	0.96	0.95	0.98	0.96	0.96	0.95	1.16	0.99	1.02
U30119	31.57	37.66	43.92	49.97	48.54	59.00	43.69	40.37	42.40
U33119	15.95	26.83	43.43	58.54	69.32	93.33	82.40	64.39	52.68
U36122	16.59	33.27	43.03	60.32	70.08	73.70	63.44	58.63	41.33
U39122	42.82	47.70	41.10	67.19	91.97	76.99	69.53	75.25	45.71
SLSF	29.99	33.25	30.23	23.25	18.07	16.23	17.39	18.54	21.40
SLMON	24.20	22.76	19.39	16.78	12.95	14.12	14.56	13.86	18.91
SLSM	20.05	21.77	18.34	15.06	15.84	14.11	14.08	13.59	17.06
SLLA	16.24	16.98	14.61	10.52	11.39	12.63	12.07	12.75	15.96
SLSD	20.88	20.28	18.32	17.22	16.77	17.51	17.50	19.18	21.82

Variable Code	Sample Std Deviation			
	Month			ALL
	Oct	Nov	Dec	
RAINSF	32.61	51.66	64.30	57.61
RAINLA	13.16	49.54	57.79	51.72
RAINSF	17.95	29.25	49.03	34.18
SALTOP	10.22	9.41	12.42	15.07
SALBOT	9.47	9.38	11.74	14.24
SSTF	1.10	1.16	0.92	1.29
SSTPG	0.98	0.93	0.91	1.20
SSTSLW	1.16	1.20	0.93	1.68
SSTSD	0.83	0.96	0.98	2.47
U30119	31.60	34.12	24.93	67.11
U33119	31.76	22.53	12.93	119.44
U36122	22.45	19.30	10.96	99.81
U39122	32.39	19.70	21.36	100.55
SLSF	20.43	25.81	25.64	26.26
SLMON	15.95	21.42	18.41	22.37
SLSM	19.05	19.66	19.87	23.36
SLLA	16.18	16.42	16.61	20.94
SLSD	20.98	21.55	20.88	25.01

Table 4 (cont.). Summary statistics of ENVIRON.MASTER1, by month.

Variable Code	Non-Missing Observations												
	Month												ALL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
RAINSF	65	65	65	65	65	65	65	65	65	65	65	65	780
RAINLA	65	65	65	65	65	65	65	65	65	65	65	65	780
RAINSO	65	65	65	65	65	65	65	65	65	65	65	65	780
SALTOP	65	65	65	65	65	65	65	65	65	65	65	65	780
SALBOT	58	57	57	57	58	58	59	58	58	58	59	59	696
SSTF	47	47	45	45	47	46	47	47	47	47	47	47	559
SSTPG	62	62	62	62	61	61	62	62	62	62	62	62	742
SSTSLW	37	37	37	34	36	36	38	39	38	38	39	35	444
SSTSD	65	65	65	65	65	65	65	65	65	65	65	65	780
U30119	39	39	39	39	39	39	39	39	39	39	39	39	468
U33119	39	39	39	39	39	39	39	39	39	39	39	39	468
U36122	39	39	39	39	39	39	39	39	39	39	39	39	468
U39122	39	39	39	39	39	39	39	39	39	39	39	39	468
SLSF	65	65	65	65	65	65	65	65	65	65	65	65	780
SLMON	20	21	21	21	21	21	22	21	21	21	21	21	252
SLSM	43	43	43	43	43	43	43	44	44	44	44	45	522
SLLA	61	60	60	60	60	60	60	61	61	61	61	61	726
SLSD	65	65	65	65	65	65	65	65	65	65	65	65	780

Table 5a. Trend analysis of variable SLSF.

Model: DSLSF

Dep Variable: SLSF

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	147770.80392	147770.80392	363.275	0.0001
Error	766	311588.85103	406.77396		
C Total	767	459359.65495			
Root MSE		20.16864	R-Square	0.3217	
Dep Mean		879.32943	Adj R-Sq	0.3208	
C.V.		2.29364			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	885.318486	0.79271116	1116.824	0.0001
DATE	1	0.002053	0.00010769	19.060	0.0001

Table 5b. Trend analysis of variable SLLA.

Model: DSLLA

Dep Variable: SLLA

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	12838.90729	12838.90729	32.325	0.0001
Error	711	282393.97910	397.17859		
C Total	712	295232.88640			
Root MSE		19.92934	R-Square	0.0435	
Dep Mean		652.66480	Adj R-Sq	0.0421	
C.V.		3.05353			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	654.195045	0.79340608	824.540	0.0001
DATE	1	0.000673	0.00011836	5.686	0.0001

Table 5c. Trend analysis of variable SLSD.

Model: DSLSD
Dep Variable: SLSD

<u>Analysis of Variance</u>					
Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	128327.10110	128327.10110	310.958	0.0001
Error	766	316114.81557	412.68253		
C Total	767	444441.91667			
Root MSE		20.31459	R-Square	0.2887	
Dep Mean		642.36458	Adj R-Sq	0.2878	
C.V.		3.16247			
<u>Parameter Estimates</u>					
Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	647.945730	0.79844764	811.507	0.0001
DATE	1	0.001913	0.00010847	17.634	0.0001

Table 5d. Trend analysis of variable SSTF.

Model: DSSTF
Dep Variable: SSTF

<u>Analysis of Variance</u>					
Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	10.08740	10.08740	6.352	0.0120
Error	537	852.76746	1.58802		
C Total	538	862.85486			
Root MSE		1.26017	R-Square	0.0117	
Dep Mean		12.20412	Adj R-Sq	0.0099	
C.V.		10.32575			
<u>Parameter Estimates</u>					
Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	12.230770	0.05529970	221.172	0.0001
DATE	1	0.000020138	0.00000799	2.520	0.0120

Table 5e. Trend analysis of variable SSTPG.

Model: DSSTPG

Dep Variable: SSTPG

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	46.20704	46.20704	35.012	0.0001
Error	728	960.77636	1.31975		
C Total	729	1006.98340			
Root MSE		1.14880	R-Square	0.0459	
Dep Mean		13.01474	Adj R-Sq	0.0446	
C.V.		8.82694			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	13.133665	0.04703004	279.261	0.0001
DATE	1	0.000037562	0.00000635	5.917	0.0001

Table 5f. Trend analysis of variable SSTSLW.

Model: DSSTSLW

Dep Variable: SSTSLW

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	61.18392	61.18392	23.250	0.0001
Error	424	1115.79313	2.63159		
C Total	425	1176.97705			
Root MSE		1.62222	R-Square	0.0520	
Dep Mean		13.83498	Adj R-Sq	0.0497	
C.V.		11.72548			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	13.661315	0.08645561	158.015	0.0001
DATE	1	0.000093077	0.00001930	4.822	0.0001

Table 5g. Trend analysis of variable SSTSD.

Model: DSSTSD

Dep Variable: SSTSD

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.01847	0.01847	0.003	0.9561
Error	766	4668.96190	6.09525		
C Total	767	4668.98038			
Root MSE		2.46886	R-Square	0.0000	
Dep Mean		16.88574	Adj R-Sq	-0.0013	
C.V.		14.62095			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t for H0: Parameter=0	Prob > t
INTERCEP	1	16.883625	0.09703629	173.993	0.0001
DATE	1	-0.000000726	0.00001318	-0.055	0.9561

Table 6. Contents of SAS data set ENVIRON.DETREND.

SAS CONTENTS PROCEDURE

Dsname: ENVIRON.DETREND

Data Set Label: Detrended SST and Sea Level Data

Number of Observations: 780

Number of Variables: 7

Record Length: 60

Data Set Type:

Memtype: DATA

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Leng	Pos	Format	Label
1	DATE	Num	8	4	DATE7.	Date
2	SLLA	Num	8	12		Detrended SL, Los Angeles
3	SLSD	Num	8	20		Detrended SL, San Diego
4	SLSF	Num	8	28		Detrended SL, San Francisco
5	SSTF	Num	8	36		Detrended SST, Farallon Islands
6	SSTPG	Num	8	44		Detrended SST, Pacific Grove
7	SSTSLW	Num	8	52		Detrended SST, San Luis Wharf

Table 7. Summary statistics of ENVIRON.DETREND, by month.

Variable Code	Mean						
	Month						
	Jan	Feb	Mar	Apr	May	Jun	Jul
SSTF	-0.41	-0.35	-0.58	-0.92	-0.92	-0.54	0.08
SSTPG	-1.14	-0.93	-0.73	-0.54	-0.26	0.43	0.90
SSTSLW	-1.25	-1.13	-1.39	-1.46	-0.92	0.21	1.54
SLSF	10.11	8.62	-7.80	-20.95	-17.90	-6.83	3.55
SLLA	-2.73	-8.67	-19.37	-24.67	-16.93	-3.66	10.85
SLSD	-3.28	-10.26	-20.45	-24.33	-17.17	-3.92	11.70

Variable Code	Mean					
	Month					ALL
	Aug	Sep	Oct	Nov	Dec	
SSTF	0.70	1.35	1.35	0.67	0.01	0.04
SSTPG	1.03	1.32	0.87	-0.04	-0.64	0.02
SSTSLW	2.08	1.98	1.27	0.05	-0.94	0.04
SLSF	7.75	14.75	6.40	3.78	8.59	0.84
SLLA	18.90	24.19	15.38	6.97	4.55	0.49
SLSD	19.09	26.07	16.23	7.63	4.76	0.51

Table 7 (cont.). Summary statistics of ENVIRON.DETREND, by month.

Variable Code	Sample Std Deviation							
	Month							
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
SSTF	0.94	1.13	1.12	1.16	1.08	0.95	0.92	0.95
SSTPG	0.85	0.89	0.90	0.79	0.78	0.83	0.69	0.75
SSTSLW	0.89	0.97	1.05	0.92	0.94	0.93	0.90	0.93
SLSF	22.11	28.44	24.97	19.63	13.72	11.60	12.12	10.36
SLLA	15.19	15.99	13.79	10.07	10.58	11.46	11.30	11.81
SLSD	15.08	14.72	12.51	11.43	11.19	11.26	11.49	11.77

Variable Code	Sample Std Deviation				
	Month				ALL
	Sep	Oct	Nov	Dec	
SSTF	1.00	1.06	1.12	0.90	1.28
SSTPG	0.84	0.91	0.85	0.89	1.16
SSTSLW	0.96	1.05	1.15	0.91	1.64
SLSF	14.13	13.81	18.77	20.04	21.27
SLLA	14.77	15.52	15.77	16.26	20.33
SLSD	14.64	15.46	16.33	16.59	20.77

Variable Code	Non-Missing Obs												
	Month												ALL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
SSTF	47	47	45	45	47	46	47	47	47	47	47	47	559
SSTPG	62	62	62	62	61	61	62	62	62	62	62	62	742
SSTSLW	37	37	37	34	36	36	38	39	38	38	39	35	444
SLSF	65	65	65	65	65	65	65	65	65	65	65	65	780
SLLA	61	60	60	60	60	60	60	61	61	61	61	61	726
SLSD	65	65	65	65	65	65	65	65	65	65	65	65	780

Table 8. Summary statistics of ENVIRON.MASTER3, by month.

Variable Code	Mean											
	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RAINSF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RAINLA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RAINSF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALTOP	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SALBOT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSTF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSTPG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSTSLW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSTSD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U30119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U33119	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U36122	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
U39122	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SLSF	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SLLA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SLSD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Variable Code	Sample Std Deviation											
	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
RAINSF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RAINLA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RAINSF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SALTOP	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SALBOT	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SSTF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SSTPG	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SSTSLW	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SSTSD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
U30119	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
U33119	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
U36122	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
U39122	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SLSF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SLLA	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SLSD	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 8 (cont.). Summary statistics of ENVIRON.MASTER3, by month.

Variable Code	Non-Missing Obs												
	Month												ALL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
RAINSF	65	65	65	65	65	65	65	65	65	65	65	65	780
RAINLA	65	65	65	65	65	65	65	65	65	65	65	65	780
RAINSF	65	65	65	65	65	65	65	65	65	65	65	65	780
SALTOP	65	65	65	65	65	65	65	65	65	65	65	65	780
SALBOT	58	57	57	57	58	58	59	58	58	58	59	59	696
SSTF	47	47	45	45	47	46	47	47	47	47	47	47	559
SSTPG	62	62	62	62	61	61	62	62	62	62	62	62	742
SSTSLW	37	37	37	34	36	36	38	39	38	38	39	35	444
SSTSD	65	65	65	65	65	65	65	65	65	65	65	65	780
U30119	39	39	39	39	39	39	39	39	39	39	39	39	468
U33119	39	39	39	39	39	39	39	39	39	39	39	39	468
U36122	39	39	39	39	39	39	39	39	39	39	39	39	468
U39122	39	39	39	39	39	39	39	39	39	39	39	39	468
SLSF	65	65	65	65	65	65	65	65	65	65	65	65	780
SLLA	61	60	60	60	60	60	60	61	61	61	61	61	726
SLSD	65	65	65	65	65	65	65	65	65	65	65	65	780

Table 9. Contents of SAS data set ENVIRON.MASTER4.

SAS CONTENTS PROCEDURE

Dsname: ENVIRON.MASTER4
 Data Set Label: Env Data w/ Missval Estimated
 Number of Observations: 780
 Number of Variables: 19
 Record Length: 156
 Data Set Type:
 Memtype: DATA

-----Alphabetic List of Variables and Attributes-----

#	Variable	Type	Leng	Pos	Format	Informat	Label
5	DATE	Num	8	36	MONYY7.		Date
7	MONTH	Num	8	52			Month
9	RAINLA	Num	8	68			
10	RAINSF	Num	8	76			
8	RAINSF	Num	8	60			
12	SALBOT	Num	8	92			
11	SALTOP	Num	8	84			
18	SLLA	Num	8	140			
19	SLSD	Num	8	148			
17	SLSF	Num	8	132			
13	SSTF	Num	8	100			
14	SSTPG	Num	8	108			
16	SSTSD	Num	8	124			
15	SSTSLW	Num	8	116			
3	U36122	Num	8	20			
2	U33119	Num	8	12			
1	U30119	Num	8	4			
4	U39122	Num	8	28			
6	YEAR	Num	8	44			Year

Table 10. Summary statistics of ENVIRON.MASTER4, by month.

Variable Code	Mean						
	Month						
	Jan	Feb	Mar	Apr	May	Jun	Jul
RAINSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RAINLA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
RAINSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SALTOP	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SALBOT	-0.043	-0.004	0.001	-0.039	-0.027	-0.017	-0.020
SSTF	-0.111	-0.103	-0.107	-0.036	-0.025	0.035	0.020
SSTPG	0.018	0.020	-0.017	-0.018	-0.033	-0.035	-0.004
SSTSLW	-0.004	0.006	0.032	0.033	0.063	0.104	0.083
SSTSD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U30119	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U33119	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U36122	0.000	0.000	0.000	0.000	0.000	0.000	0.000
U39122	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SLSF	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SLLA	-0.010	-0.021	-0.026	-0.032	0.004	-0.003	0.007
SLSD	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variable Code	Mean					
	Month					ALL
	Aug	Sep	Oct	Nov	Dec	
RAINSF	0.000	0.000	0.000	0.000	0.000	0.000
RAINLA	0.000	0.000	0.000	0.000	0.000	0.000
RAINSF	0.000	0.000	0.000	0.000	0.000	0.000
SALTOP	0.000	0.000	0.000	0.000	0.000	0.000
SALBOT	-0.014	-0.030	-0.055	0.005	-0.047	-0.024
SSTF	-0.062	-0.072	-0.103	-0.067	-0.023	-0.055
SSTPG	-0.003	0.012	0.012	0.001	0.021	-0.002
SSTSLW	-0.023	-0.027	-0.004	0.016	0.058	0.028
SSTSD	0.000	0.000	0.000	0.000	0.000	0.000
U30119	0.000	0.000	0.000	0.000	0.000	0.000
U33119	0.000	0.000	0.000	0.000	0.000	0.000
U36122	0.000	0.000	0.000	0.000	0.000	0.000
U39122	0.000	0.000	0.000	0.000	0.000	0.000
SLSF	0.000	0.000	0.000	0.000	0.000	0.000
SLLA	-0.009	-0.023	0.011	-0.011	-0.025	-0.012
SLSD	0.000	0.000	0.000	0.000	0.000	0.000

Table 10 (cont.). Summary statistics of ENVIRON.MASTER4, by month.

Variable Code	Sample Std Deviation						
	Month						
	Jan	Feb	Mar	Apr	May	Jun	Jul
RAINSF	1.000	1.000	1.000	1.000	1.000	1.000	1.000
RAINLA	1.000	1.000	1.000	1.000	1.000	1.000	1.000
RAINSF	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SALTOP	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SALBOT	1.048	0.986	0.964	0.969	0.965	0.956	0.970
SSTF	0.912	0.898	0.916	0.892	0.873	0.885	0.887
SSTPG	1.015	0.992	1.006	1.002	0.999	0.989	0.982
SSTSLW	0.916	0.939	0.926	0.896	0.859	0.815	0.864
SSTSD	1.000	1.000	1.000	1.000	1.000	1.000	1.000
U30119	1.000	1.000	1.000	1.000	1.000	1.000	1.000
U33119	1.000	1.000	1.000	1.000	1.000	1.000	1.000
U36122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
U39122	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SLSF	1.000	1.000	1.000	1.000	1.000	1.000	1.000
SLLA	0.972	0.971	0.972	0.979	0.965	0.963	0.987
SLSD	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Variable Code	Sample Std Deviation					
	Month					ALL
	Aug	Sep	Oct	Nov	Dec	
RAINSF	1.000	1.000	1.000	1.000	1.000	0.993
RAINLA	1.000	1.000	1.000	1.000	1.000	0.993
RAINSF	1.000	1.000	1.000	1.000	1.000	0.993
SALTOP	1.000	1.000	1.000	1.000	1.000	0.993
SALBOT	0.991	0.995	1.077	1.016	1.054	0.993
SSTF	0.906	0.883	0.902	0.926	0.929	0.896
SSTPG	0.994	1.000	0.999	1.014	1.048	0.997
SSTSLW	0.862	0.877	0.883	0.909	0.899	0.882
SSTSD	1.000	1.000	1.000	1.000	1.000	0.993
U30119	1.000	1.000	1.000	1.000	1.000	0.988
U33119	1.000	1.000	1.000	1.000	1.000	0.988
U36122	1.000	1.000	1.000	1.000	1.000	0.988
U39122	1.000	1.000	1.000	1.000	1.000	0.988
SLSF	1.000	1.000	1.000	1.000	1.000	0.993
SLLA	0.977	0.973	0.981	0.993	0.980	0.969
SLSD	1.000	1.000	1.000	1.000	1.000	0.993

Table 10 (cont.). Summary statistics of ENVIRON.MASTER4, by month.

Variable Code	Non-Missing Obs												
	Month												ALL
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
RAINSF	65	65	65	65	65	65	65	65	65	65	65	65	780
RAINLA	65	65	65	65	65	65	65	65	65	65	65	65	780
RAINSO	65	65	65	65	65	65	65	65	65	65	65	65	780
SALTOP	65	65	65	65	65	65	65	65	65	65	65	65	780
SALBOT	65	65	65	65	65	65	65	65	65	65	65	65	780
SSTF	65	65	65	65	65	65	65	65	65	65	65	65	780
SSTPG	65	65	65	65	65	65	65	65	65	65	65	65	780
SSTSLW	65	65	65	65	65	65	65	65	65	65	65	65	780
SSTSD	65	65	65	65	65	65	65	65	65	65	65	65	780
U30119	39	39	39	39	39	39	39	39	39	39	39	39	468
U33119	39	39	39	39	39	39	39	39	39	39	39	39	468
U36122	39	39	39	39	39	39	39	39	39	39	39	39	468
U39122	39	39	39	39	39	39	39	39	39	39	39	39	468
SLSF	65	65	65	65	65	65	65	65	65	65	65	65	780
SLLA	65	65	65	65	65	65	65	65	65	65	65	65	780
SLSD	65	65	65	65	65	65	65	65	65	65	65	65	780

Table 11. Correlations of data in ENVIRON.MASTER4.

Correlation Coefficients / Number of Observations

RAINSF

RAINSF	RAINLA	SLSF	U39122	U36122	RAINSF
1.00000	0.33703	0.33310	-0.30018	-0.29685	0.29120
780	780	780	468	468	780
SSTF	SSTPG	U30119	SALTOP	SALBOT	SSTSLW
0.23985	0.20361	-0.16606	-0.10233	-0.09551	0.09184
780	780	468	780	780	780
SLLA	SLSD	SSTSD	U33119		
0.03071	0.02892	0.02508	0.00242		
780	780	780	468		

RAINLA

RAINLA	RAINSF	SLSF	U30119	SALTOP	
1.00000	0.33703	0.32105	-0.26410	-0.23693	
780	780	780	468	780	
U36122	SALBOT	SLSD	SLLA	SSTSLW	SSTF
-0.23423	-0.22218	0.19064	0.18583	0.17061	0.15927
468	780	780	780	780	780
SSTPG	U33119	U39122	SSTSD		
0.14740	-0.13796	-0.09660	0.09453		
780	468	468	780		

RAINSF

RAINSF	RAINLA	SLSF	SALTOP	SALBOT	RAINSF
1.00000	0.73707	0.30608	-0.30110	-0.29651	0.29120
780	780	780	780	780	780
U30119	SLSD	SLLA	U36122	SSTF	U33119
-0.25571	0.25119	0.24249	-0.20876	0.16200	-0.15779
468	780	780	468	780	468
SSTPG	SSTSLW	SSTSD	U39122		
0.14567	0.12846	0.12720	-0.06311		
780	780	780	468		

SALTOP

SALTOP	SALBOT	RAINSF	SLSF	SSTF	RAINLA
1.00000	0.97126	-0.30110	-0.27907	-0.25921	-0.23693
780	780	780	780	780	780
SLSD	SLLA	SSTPG	U36122	U33119	U39122
-0.23472	-0.19826	-0.17996	0.16760	0.16338	0.12271
780	780	780	468	468	468

Table 11 (cont.). Correlations of data in ENVIRON.MASTER4.

Correlation Coefficients / Number of Observations

SALTOP

RAINSF	SSTSLW	SSTSD	U30119
-0.10233	0.02802	0.01887	0.00281
780	780	780	468

SALBOT

SALBOT	SALTOP	RAINSF	SLSF	SLSD	SSTF
1.00000	0.97126	-0.29651	-0.25999	-0.23866	-0.22468
780	780	780	780	780	780
RAINLA	SLLA	SSTPG	U33119	U36122	RAINSF
-0.22218	-0.18848	-0.16349	0.15313	0.14358	-0.09551
780	780	780	468	468	780
U39122	SSTSLW	U30119	SSTSD		
0.07375	0.07138	-0.00826	0.00667		
468	780	468	780		

SSTF

SSTF	SSTPG	SSTSLW	SLSF	SSTSD	SLLA
1.00000	0.72514	0.67278	0.56368	0.40537	0.40238
780	780	780	780	780	780
SLSD	U36122	U39122	SALTOP	RAINSF	SALBOT
0.36287	-0.36111	-0.33817	-0.25921	0.23985	-0.22468
780	468	468	780	780	780
U30119	RAINSF	RAINLA	U33119		
-0.22392	0.16200	0.15927	-0.14080		
468	780	780	468		

SSTPG

SSTPG	SSTF	SSTSLW	SLSF	SSTSD	SLLA
1.00000	0.72514	0.64137	0.58492	0.50338	0.46945
780	780	780	780	780	780
SLSD	U36122	U39122	RAINSF	U33119	U30119
0.44655	-0.40230	-0.38477	0.20361	-0.18176	-0.18082
780	468	468	780	468	468
SALTOP	SALBOT	RAINLA	RAINSF		
-0.17996	-0.16349	0.14740	0.14567		
780	780	780	780		

SSTSLW

SSTSLW	SSTF	SSTPG	SSTSD	SLSF	SLLA
1.00000	0.67278	0.64137	0.62948	0.53153	0.49086
780	780	780	780	780	780

Table 11 (cont.). Correlations of data in ENVIRON.MASTER4.

Correlation Coefficients / Number of Observations

SSTSLW

SLSD	U30119	U36122	U39122	U33119	RAINLA
0.42404	-0.35461	-0.25595	-0.23228	-0.17731	0.17061
780	468	468	468	468	780

RAINS	RAINSF	SALBOT	SALTOP
0.12846	0.09184	0.07138	0.02802
780	780	780	780

SSTSD

SSTSD	SSTSLW	SLSD	SLLA	SSTPG	SSTF
1.00000	0.62948	0.59053	0.56200	0.50338	0.40537
780	780	780	780	780	780

SLSF	RAINS	RAINLA	U33119	U30119	U36122
0.38291	0.12720	0.09453	-0.08104	-0.07197	-0.04958
780	780	780	468	468	468

U39122	RAINSF	SALTOP	SALBOT
-0.03692	0.02508	0.01887	0.00667
468	780	780	780

SLSF

SLSF	SLSD	SLLA	SSTPG	SSTF	SSTSLW
1.00000	0.66083	0.64322	0.58492	0.56368	0.53153
780	780	780	780	780	780

U36122	SSTSD	RAINSF	RAINLA	U39122	RAINS
-0.43570	0.38291	0.33310	0.32105	-0.30730	0.30608
468	780	780	780	468	780

SALTOP	U30119	SALBOT	U33119
-0.27907	-0.27413	-0.25999	-0.20442
780	468	780	468

SLLA

SLLA	SLSD	SLSF	SSTSD	SSTSLW	SSTPG
1.00000	0.86841	0.64322	0.56200	0.49086	0.46945
780	780	780	780	780	780

SSTF	RAINS	SALTOP	SALBOT	RAINLA	U36122
0.40238	0.24249	-0.19826	-0.18848	0.18583	-0.14809
780	780	780	780	780	468

U33119	U39122	U30119	RAINSF
-0.13576	-0.09766	-0.05662	0.03071
468	468	468	780

Table 11 (cont.). Correlations of data in ENVIRON.MASTER4.

Correlation Coefficients / Number of Observations

SLSD

SLSD	SLLA	SLSF	SSTSD	SSTPG	SSTSLW
1.00000	0.86841	0.66083	0.59053	0.44655	0.42404
780	780	780	780	780	780
SSTF	RAINS	SALBOT	SALTOP	RAINLA	U33119
0.36287	0.25119	-0.23866	-0.23472	0.19064	-0.16488
780	780	780	780	780	468
U36122	U30119	U39122	RAINSF		
-0.13974	-0.07745	-0.06456	0.02892		
468	468	468	780		

U30119

U30119	U33119	U36122	SSTSLW	SLSF	RAINLA
1.00000	0.64028	0.49803	-0.35461	-0.27413	-0.26410
468	468	468	468	468	468
RAINS	SSTF	SSTPG	RAINSF	U39122	SLSD
-0.25571	-0.22392	-0.18082	-0.16606	0.14466	-0.07745
468	468	468	468	468	468
SSTSD	SLLA	SALBOT	SALTOP		
-0.07197	-0.05662	-0.00826	0.00281		
468	468	468	468		

U33119

U33119	U36122	U30119	U39122	SLSF	SSTPG
1.00000	0.70958	0.64028	0.25143	-0.20442	-0.18176
468	468	468	468	468	468
SSTSLW	SLSD	SALTOP	RAINS	SALBOT	SSTF
-0.17731	-0.16488	0.16338	-0.15779	0.15313	-0.14080
468	468	468	468	468	468
RAINLA	SLLA	SSTSD	RAINSF		
-0.13796	-0.13576	-0.08104	0.00242		
468	468	468	468		

U36122

U36122	U33119	U39122	U30119	SLSF	SSTPG
1.00000	0.70958	0.66364	0.49803	-0.43570	-0.40230
468	468	468	468	468	468
SSTF	RAINSF	SSTSLW	RAINLA	RAINS	SALTOP
-0.36111	-0.29685	-0.25595	-0.23423	-0.20876	0.16760
468	468	468	468	468	468

Table 11 (cont.). Correlations of data in ENVIRON.MASTER4.

Correlation Coefficients / Number of Observations

U36122

SLLA	SALBOT	SLSD	SSTSD
-0.14809	0.14358	-0.13974	-0.04958
468	468	468	468

U39122

U39122	U36122	SSTPG	SSTF	SLSF	RAINSF
1.00000	0.66364	-0.38477	-0.33817	-0.30730	-0.30018
468	468	468	468	468	468

U33119	SSTSLW	U30119	SALTOP	SLLA	RAINLA
0.25143	-0.23228	0.14466	0.12271	-0.09766	-0.09660
468	468	468	468	468	468

SALBOT	SLSD	RAINSF	SSTSD
0.07375	-0.06456	-0.06311	-0.03692
468	468	468	468

